

Certificate



SIL/PL
Capability

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ID 0600000000

No.: V 417.05/16

Product tested Ball Valves **Certificate holder** Cameron Valves & Measurement
845 S.E. 29th Street
Oklahoma City, OK 73129
USA

Type designation WKM 370D4,
WKM 370D6

Codes and standards IEC 61508 Parts 1-2 and 4-7:2010 IEC 61511 Parts 1-3:2004

Intended application Safety Function: Return ball valve to its required position and ensure external and internal tightness.

The valves are suitable for use in a safety instrumented system up to SIL 2. Under consideration of the minimum required hardware fault tolerance HFT=1 the valves may be used in a redundant structure up to SIL 3.

Specific requirements The instructions of the associated Installation, Operating and Safety Manual have to be considered.

Summary of test results see back side of this certificate.

Valid until 2021-03-18

The issue of this certificate is based upon an examination, whose results are documented in Report No. V 417.05/16 dated 2016-03-18.

This certificate is valid only for products which are identical with the product tested. It becomes invalid at any change of the codes and standards forming the basis of testing for the intended application.

TÜV Rheinland Industrie Service GmbH
Bereich Automation
Funktionale Sicherheit
Am Grauen Stein, 51105 Köln

Köln, 2016-03-18

Certification Body Safety & Security for Automation & Grid

Dipl.-Ing. Stephan Häb

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TÜVRheinland
Precisely Right.

Manufacturer **Cameron Valves & Measurement**
845 SE 29th Street
Oklahoma City, OK 73129

Product tested **Ball Valves WKM 370D4 and 370D6**

Device-Specific Values

Probability of Dangerous Failure on Demand	p	4,99 E-04
Confidence Level	$1-\alpha$	95 %
Safe Failure Fraction ^(see note)	SFF	72 %
Hardware Fault Tolerance	HFT	0
Diagnostic Coverage	DC	0 %
Type of Sub System		Type A
Mode of Operation		Low Demand
Proof Test Coverage	PTC	not considered
Partial Stroke Test Coverage	PSTC	not considered

Note

The Safe Failure Fraction (SFF) was estimated by an alternative method with a FMEA according to EN 161:2011/A3:2013.

Derived Values for 1oo1-Architecture

Assumed Demands per Year	n_{op}	1 / a	1,14 E-04 / h
Assumed Test Interval	T_i	8760 h	1 a
Total Failure Rate	$\lambda_S + \lambda_D$	2,04 E-07 / h	204 FIT
Lambda Dangerous Detected	λ_{DD}	0,00 E+00 / h	0 FIT
Lambda Dangerous Undetected	λ_{DU}	5,70 E-08 / h	57 FIT
Lambda Safe	λ_S	1,47 E-07 / h	147 FIT
Mean Time To Failure	MTTF	4,91 E+06 h	561 a
Mean Time To Dangerous Failure	MTTF _D	1,75 E+07 h	2.003 a
Average Probability of Failure on Demand	PFD_{avg}	2,50 E-04	

Useful Lifetime

A time of usage of more than 5 years (+ 1.5 years of storage) can only be favored under responsibility of the operator, consideration of specific external conditions (securing of required quality of media, max. temperature, time of impact), and adequate test cycles.